Epitomes

Important Advances in Clinical Medicine

Chest Diseases

The Scientific Board of the California Medical Association presents the following inventory of items of progress in chest diseases. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and important clinical significance. The items are presented in simple epitome and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist busy practitioners, students, research workers, or scholars to stay abreast of these items of progress in chest diseases that have recently achieved a substantial degree of authoritative acceptance, whether in their own field of special interest or another.

The items of progress listed below were selected by the Advisory Panel to the Section on Chest Diseases of the California Medical Association and the summaries were prepared under its direction.

Reprint requests to Division of Scientific and Educational Activities, California Medical Association, PO Box 7690, San Francisco, CA 94120-7690

Benefits of Hyperbaric Oxygen Therapy in Infectious Disease

HYPERBARIC OXYGEN greatly enhances the effectiveness of conventional therapy in treating necrotizing soft tissue infections, refractory osteomyelitis, and infected ischemic wounds. The mechanisms of this therapy explain its beneficial effects. Tissue oxygen tension has been found to be substantially reduced in infected tissue. Standard hyperbaric oxygen treatment increases the oxygen tension to normal or above normal in infected tissues. Tissue oxygen tensions increase with repetitive treatments. The increased oxygen tension produced by hyperbaric oxygen leads to the enhanced production of superoxide, hydrogen peroxide, and other toxic oxygen radicals.

Thereby, on strict anaerobic organisms, hyperbaric oxygen has a direct bactericidal effect through the production of toxic radicals. Anaerobic organisms are extremely sensitive to these oxygen radicals because most lack the superoxide-degrading enzyme, superoxide dismutase, and the hydrogen peroxide-degrading enzyme, catalase. In contrast to anaerobic organisms, hyperbaric oxygen has no direct effect on aerobic organisms. Hyperoxic conditions induce aerobic organisms to produce increased concentrations of superoxide dismutase. Phagocytic killing of many aerobic organisms is diminished under the hypoxic conditions found in infected tissues. The oxygen-dependent intracellular killing mechanisms of polymorphonuclear leukocytes require oxygen to rapidly kill many aerobic organisms. When the required oxygen is available in infected tissue through the use of hyperbaric oxygen, the level of polymorphonuclear leukocyte killing of aerobic organisms returns to normal or above normal. In addition, the aminoglycoside class of antibiotics does not kill well under low oxygen conditions. Hyperbaric oxygen potentiates the bactericidal effects of tobramycin and possibly other aminoglycosides.

Increased oxygen tension enhances wound healing by facilitating new collagen formation and subsequent angiogenesis. When the environment of fibroblasts has a low oxygen tension—less than 10 mm of mercury—the cells cannot sensitize collagen or migrate appropriately. Hyperbaric oxygen increases the oxygen availability to the fibroblasts and thereby facilitates new collagen formation and subsequent angiogenesis or migration of the ingrowing blood vessels. Hyperbaric oxygen, therefore, promotes faster healing in hypoxic infected wounds not only by increasing the effectiveness of the antibiotics but also by enhancing the collagen production and blood vessel migration.

JON T. MADER, MD
JASON CALHOUN, MD
Galveston, Texas

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Airway Obstruction in Sarcoidosis

THE LUNGS are the most commonly involved organs in patients with sarcoidosis. The granulomata typically occur along lobular septa and are scattered throughout the pulmonary interstitium and alveolar walls. Bronchial or peribronchial granulomata occur frequently, and a granulomatous mass may protrude into the bronchial lumen on occasion. In the past, extensive physiologic studies, with a few exceptions, emphasized functional changes characteristic of restrictive pulmonary disease—that is, reduced static lung volumes, impaired diffusing capacity (transfer factor), and reduced pulmonary compliance. Recently, however, several studies have reassessed airway function in sarcoidosis.

In one study from Greece, airflow obstruction was noted in at least 30% of stage I patients and at least 44% of stage II patients. In another study of 123 consecutive black patients with sarcoidosis, 78 (63%) had reduced ratios of the forced expiratory volume in one second (FEV_1) to the forced vital capacity. Thus, airway obstruction is a common feature of sarcoidosis; the exact incidence of the abnormality varies, depending on racial and genetic factors.

Sarcoid granulomata protrude in the lumen of the airways and influence their function; enlarged lymph nodes may compress bronchi and produce narrowing; finally, in ad-